Claims:

- 1. A composition comprising lithium or a salt thereof and an agent that creates an environment favorable for axonal growth and a pharmaceutically acceptable carrier.
- The composition of claim 1, wherein the agent is selected from the group consisting of
 NGF, BDNF, NT-3, 4, 5, or 6, CNTF, LIF, IGFI, IGFII, GDNF, GPA, bFGF, TGFB, and apolipoprotein E.
 - 3. A vehicle for administration to a subject, comprising the composition of claim 1.
 - 4. The vehicle of claim 3, which is a tube, catheter or stent.
 - 5. The vehicle of claim 4, which is a syringe.
- 10 6. The composition of claim 1, which is in the form of a tablet.
 - 7. A method for promoting axonal growth in a neural cell, comprising contacting the neural cell with an amount of lithium or salt thereof sufficient to stimulate axonal growth, such that axonal growth occurs.
 - 8. The method of claim 7, wherein the neural cell is a central nervous system (CNS) neural cell.
 - 9. The method of claim 7, wherein the neural cell is in the peripheral nervous system.
 - 10. A method for treating a subject that has suffered a traumatic injury in which nerve cell injury has occurred, comprising administering to the subject lithium or a salt thereof, in an amount sufficient to stimulate axon regeneration, such that the subject is treated.
 - 11. The method of claim 10, wherein administering comprises providing lithium or a salt thereof to the site of nerve cell injury.
 - 12. The method of claim 11, wherein the lithium or a salt thereof is injected into the site of nerve cell injury.
- 13. The method of claim 10, further comprising administering an agent that creates an environment favorable for axonal growth.
 - 14. The method of claim 13, wherein the agent is selected from the group consisting of NGF, BDNF, NT-3, 4, 5, or 6, CNTF, LIF, IGFI, IGFII, GDNF, GPA, bFGF, TGFB, and apolipoprotein E.
 - 15. The method of claim 10, wherein the nerve cell injury is a spinal cord injury.
- 30 16. The method of claim 10, wherein the nerve cell injury is a peripheral nervous system injury.

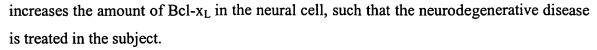
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100 mg



- 17. The method of claim 10, wherein the nerve cell injury is an optic nerve injury.
- 18. A method for treating a subject for a state characterized by diminished potential axonal growth, comprising administering to the subject lithium or a salt thereof, in an amount sufficient to stimulate axonal growth, such that the subject is treated.
- 5 19. The method of claim 18, wherein the state is a CNS disorder.
 - 20. The method of claim 18, wherein the state is a peripheral nervous system disorder.
 - 21. The method of claim 18, wherein the state is glaucoma.
 - 22. A method for stimulating axon growth of a neural cell in vitro, comprising contacting a neural cell with an amount of lithium or salt thereof sufficient to stimulate axon growth, such that the neural cell growths at least one axon.
 - 23. The method of claim 22, wherein the neural cell is obtained from a subject.
 - 24. The method of claim 22, wherein the neural cell is a cell that was differentiated from a stem cell.
 - 25. A method for treating a subject for a state characterized by diminished potential axonal growth or a traumatic injury in which nerve cell injury has occurred, comprising administering to the subject a cell obtained according to the method of claim 22.
 - 26. A method for treating a subject for a state characterized by diminished potential axonal growth or a traumatic injury in which nerve cell injury has occurred, comprising obtaining a neural cell from the subject, treating the cell according to the method of claim 22, and administering the neural cell with at least one axon back into the subject.
 - 27. A method for preventing neural cell degeneration, comprising contacting the neural cell with an agent that increases the amount of Bcl-x_L in the neural cell, such that neural cell degeneration is prevented.
- 28. The method of claim 27, comprising contacting the neural cell with a nucleic acid encoding a Bcl-x_L protein or portion thereof sufficient for preventing neural cell degeneration.
 - 29. The method of claim 27, comprising contacting the neural cell with a Bcl-x_L protein, such that the protein enters the neural cell.
- 30. A method for treating a neurodegenerative disease in a subject, comprising contacting neural cells of the subject that are undergoing neurodegeneration with an agent that

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- 31. A method for treating a subject having a partial or complete sectioning of the spinal cord or a nerve, comprising
- providing the ends of the spinal cord or nerve within less than about 100 μm distance from each other; and
 - contacting at least one cell from the spinal cord or nerve with an agent that increases the level of bcl-2 protein within the cell,
 - 32. The method of claim 31, wherein the agent is provided at the site of the sectioning of the spinal cord or nerve.
 - 33. The method of claim 31, wherein the agent is lithium or a salt thereof.

such that the cell grows at least one axon, to thereby treat the subject.

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